

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1. (Currently Amended) A method in a data processing system for managing data in a file system, the method comprising:
  - detecting a request to modify a data block in the file system;
  - responsive to detecting the request[[,]]:
    - writing metadata describing the data block in the file system into a snapshot image, wherein the snapshot image is updated to maintain a consistent block-level image of the file system from a point-in-time when the snapshot was created; and
    - copying data for the data block in the file system to the snapshot image to further update the snapshot image; and
    - modifying the data block in the file system after copying of the data in the data block to the snapshot image has occurred, wherein the snapshot image ~~may be used~~ is usable to return the file system to a state prior to modifying the data block in the file system.
2. (Original) The method of claim 1, wherein the copying step includes:
  - storing an identification of information used to locate the data in a table within the snapshot image, wherein the table is used to locate different data blocks in the file system.
3. (Original) The method of claim 1, wherein the snapshot image includes a snapshot summary map, a snapshot map, and a set of segments and wherein the summary map identifies initialized states for snapshot map pages in the snapshot map, the snapshot map contains the snapshot map pages that identify data blocks in use in the file system, and the set of segments includes copies of data blocks from the file system.
4. (Currently Amended) The method of claim 1, wherein the metadata includes a snapshot summary map, a ~~summary~~ snapshot map, and segment headers and wherein the metadata of the snapshot image is used to reconstruct the state of the file system in response to a selected event.
5. (Original) The method of claim 4, wherein the selected event is a failure of the data processing system while modifying the data block in the file system.

6. (Original) The method of claim 4, wherein the selected event is a user input requesting restoration of the file system to a consistent state.
7. (Original) The method of claim 1, wherein the writing step comprises:  
writing an in-use state of snapshot map entries for a snapshot map group to the snapshot image prior to any before-image data blocks referenced by the snapshot map group being written to the snapshot image.
8. (Original) The method of claim 7, wherein the writing step further comprises:  
marking a summary snapshot map entry as being initialized and marking a location of the snapshot map group after writing the in-use state of data blocks for the snapshot map group to the snapshot image.
9. (Original) The method of claim 8, wherein the writing step further comprises:  
initializing a segment header of a new last segment in a list of segments before a prior segment is modified to point to the new last segment.
10. (Original) The method of claim 4, wherein the snapshot map contains snapshot map pages and wherein the snapshot map pages are reconstructed during a recovery operation.
11. (Original) The method of claim 10, wherein the recovery operation handles copying of before-images of data blocks in the file system that are to be modified by the recovery operation.
12. (Currently Amended) A data processing system for managing data in a file system, the data processing system comprising:  
detecting means for detecting a request to modify a data block in the file system;  
~~writing means~~, responsive to detecting the request[[],]:  
writing means for writing metadata describing the data block in the file system into a snapshot image, wherein the snapshot image is updated to maintain a consistent block-level image of the file system from a point-in-time when the snapshot was created; and  
~~copying means, responsive to detecting the request,~~ for copying data for the data block in the file system to the snapshot image to further update the snapshot image; and

modifying means for modifying the data block in the file system after copying of the data in the data block to the snapshot image has occurred, wherein the snapshot image ~~may be used~~ is usable to return the file system to a state prior to modifying the data block in the file system.

13. (Original) The data processing system of claim 12, wherein the copying means includes:  
storing means for storing an identification of information used to locate the data in a table within the snapshot image, wherein the table is used to locate different data blocks in the file system.

14. (Original) The data processing system of claim 12, wherein the snapshot image includes a snapshot summary map, a snapshot map, and a set of segments and wherein the summary map identifies initialized states for snapshot map pages in the snapshot map, the snapshot map contains the snapshot map pages that identify data blocks in use in the file system, and the set of segments includes copies of data blocks from the file system.

15. (Currently Amended) The data processing system of claim 12, wherein the metadata includes a snapshot summary map, a ~~summary~~ snapshot map, and segment headers and wherein the metadata of the snapshot image is used to reconstruct the state of the file system in response to a selected event.

16. (Original) The data processing system of claim 15, wherein the selected event is a failure of the data processing system while modifying the data block in the file system.

17. (Original) The data processing system of claim 15, wherein the selected event is a user input requesting restoration of the file system to a consistent state.

18. (Currently Amended) A computer program product in a computer readable medium for managing data in a file system in a data processing system, the computer program product comprising:  
first instructions for detecting a request to modify a data block in the file system;  
~~second instructions, responsive to detecting the request~~[[.]]:  
second instructions for writing metadata describing the data block in the file system into a snapshot image, wherein the snapshot image is updated to maintain a consistent block-level image of the file system from a point-in-time when the snapshot was created; and  
~~third instructions, responsive to detecting the request,~~ for copying data for the data block in the file system to the snapshot image to further update the snapshot image; and

fourth instructions for modifying the data block in the file system after copying of the data in the data block to the snapshot image has occurred, wherein the snapshot image ~~may be used~~ is usable to return the file system to a state prior to modifying the data block in the file system.

19. (Original) The computer program product of claim 18, wherein the third instructions includes: sub-instructions for storing an identification of information used to locate the data in a table within the snapshot image, wherein the table is used to locate different data blocks in the file system.

20. (Original) The computer program product of claim 18, wherein the snapshot image includes a snapshot summary map, a snapshot map, and a set of segments, wherein the summary map identifies initialized states for snapshot map pages in the snapshot map, the snapshot map contains the snapshot map pages that identify data blocks in use in the file system or data blocks copied into the snapshot, and the set of segments includes copies of data blocks from the file system.

21. (Currently Amended) The computer program product of claim 18, wherein the metadata includes a snapshot summary map, a ~~summary~~ snapshot map, and segment headers and wherein the metadata of the snapshot image is used to reconstruct the state of the file system in response to a selected event.

22. (Original) The computer program product of claim 21, wherein the selected event is a failure of the data processing system while modifying the data block in the file system.

23. (Original) The computer program product of claim 21, wherein the selected event is a user input requesting restoration of the file system to a consistent state.

24. (Currently Amended) A data processing system comprising:  
a bus system;  
a memory connected to the bus system, wherein the memory includes a set of instructions; and  
a processing unit connected to the bus system, wherein the processing unit executes a set of instructions to detect a request to modify a data block in the file system; write metadata describing the data block in the file system into a snapshot image, in response to detecting the request, wherein the snapshot image is updated to maintain a consistent block-level image of the file system from a point-in-time when the snapshot was created; copy data for the data block in the file system to the snapshot image to further update the snapshot image in response to detecting the request; and modify the data block in the file system after copying of the data in the data block to the snapshot image has occurred, wherein the

snapshot image ~~may be used~~ is usable to return the file system to a state prior to modifying the data block in the file system.